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International Patent Application PCT/EP2004/009491
Applicant: Borealis Technology Oy

This is in reply to the Written Opinion forwarded together with the International Search Report on November 11, 2004:

1. Clarity (Art. 6 PCT)

1.1 In the Written Opinion, sheet 2, last paragraph, it is pointed out that claim 5 is considered to not be supported by the description for the reason that on page 10, fourth paragraph of the application, it is disclosed that the inorganic filler can comprise a hydroxide or a hydrated compound whereas according to claim 5 the composition does not contain a hydroxide or a hydrated compound.

1.2 However, claim 5 as a dependent claim is designed for claiming a preferred embodiment of the invention, which in this case is the absence of hydroxide or hydrated compounds. Thus, the subject-matter of independent claim 1 may, but not necessarily must contain the features given in subclaim 5 (or any other of the subclaims) and this, in turn, means that the inorganic filler (C) of claim 1 may both be free of hydroxide or hydrated compounds but may also comprise such compounds. This is in accordance with the dis-

closure in paragraphs 1 to 5 on page 10 of the present application. However, it is clear that claim 5 requires the absence of hydroxide or hydrated compounds.

1.3 Summing up above paragraphs 1.1 and 1.2 it is respectfully submitted that claim 5 contains subject-matter which is a preferred embodiment of the invention and thus the presence of this claim does not render the claimed subject-matter unclear.

2. Novelty (Art. 33(2) PCT)

2.1 D1 (EP 0 393 9595) discloses a flame retardant polymer composition comprising in essence an ethylene copolymer, a silicone compound and an inorganic filler (see e.g. claim 1). Regarding the particle size of the inorganic filler, a statement is contained on page 3, lines 45/46 which discloses that in general the inorganic filler should have an average particle size of less than 50 micron. As a most preferred embodiment in line 46, an average particle size of about 0.5 to 2.0 micron is stated.

2.2 First, it must be emphasized that this disclosure on page 3 of D1 relates to the *average* particle size but is silent on the particle size *distribution*. Thus, there is no teaching of a particular particle size distribution in D1 which accordingly may be freely chosen as long as the average particle size is within the range prescribed on page 3, lines 45/46.

2.3 Furthermore, D1 is silent on whether the average particle size is determined as a weight average size or a number average size. This again may give rise to entirely different particle size distributions which nevertheless would fall under the definition of average particle size as contained on page 3, lines 45/46.

2.4 In this context it is important to note that the ranges, and in particular the preferred ranges, for the average particle size given in D1 can be understood from the standpoint that D1 wants to provide a homogenous composition, which is certainly easier to achieve by choosing particles having a comparatively low average particle size. However, the influence of the particle size on the flame retardant properties and hence the importance of the size distribution has not been realized. This can be seen e.g. from the exam-

ples where inorganic fillers with an average particle size of between 0.7 to 5 (!) microns have been used. Also here, D1 is silent on the actual particle size distribution, let alone discloses a particle size distribution as required by present claim 1.

2.5 The present application is based on the finding that it is essential for improving the flame retardancy to include a certain minimum amount of very fine particles in the composition. Accordingly, in contrast to D1, claim 1 of the present application requires that the *particle size distribution* of the inorganic filler (C) is so that at *least 10 wt.-% of the total polymer composition of particles with a size of below 0.7 micrometer*. Thus, the present application does not necessarily prescribe a certain *average* particle size but requires, as stated above, that the composition comprises at least 10 wt.-% of particles wherein each particle has a size of below 0.7 micrometer.

2.6 Summing up the above considerations, it is respectfully submitted that due to the lack of disclosure of a particle size distribution in D1, the subject matter of claim 1 and accordingly, of all further claims, must be acknowledged as novel over D1.

2.7 D2 is concerned with flame retardant polycarbonate resin compositions (see e.g. page 2, lines 5/9) which may, as pointed out by the Examiner, inter alia contain polyolefin resins as thermoplastic resins (E). However, amended claim 1 now requires that component A of the claimed composition is an olefin homo- or copolymer and must be present in an amount of from 30 to 70 wt.-% of the total composition. Compositions comprising such a high amount of polyolefin are not disclosed in D2 which is related to resin compositions comprising polycarbonate as a main constituent. Accordingly, the subject matter claimed in the present application already for this reason is also novel over D2.

3. Inventive step (Art. 33(3) PCT)

3.1 Document D1 relates to flame retardant polymer compositions comprising as one main component an olefin copolymer, a silicon compound and an inorganic filler which compositions are intended especially for use in wire and cable applications (see claims 12, 13). Thus, D1 relates to the same

technical field as the present invention and is therefore considered as closest prior art document.

3.2 The problem of the present invention versus D1 is to improve the flame retardant properties, in particular to provide a composition passing the single wire burning test and showing improved dripping properties (page 3, 2nd paragraph of the present application). The present invention is based on the finding that this problem can be solved by using an inorganic filler having the particular particle size distribution as prescribed by claim 1, i.e. which has a particle size distribution so that at least 10 wt.-% of the total polymer composition consists of particles with a size of below 0.7 microns.

3.3 The beneficial technical effect of the subject matter of claim 1 can be seen in Tables 1 and 2 on pages 16 and 17 of the present application. There, it can be seen in the last line of Table 1 that all composition in the examples according to the present invention pass the single wire burning test whereas the comparative examples fail in this test. Furthermore, it can be seen from Table 2 that the dripping tendency also is drastically improved.

3.4 In this regard, it is first remarked that the comparative examples have been prepared using an inorganic filler with an average particle size of 1.4 micron which is perfectly within the preferred range as given in D1. However, as can be seen from Figure 1 of the present application, the use of such a filler would not fulfill the requirements of present claim 1.

3.5 Second, while D1 is especially concerned with the provision of compositions having a good flame retardency in terms of the limiting oxygen index (LOI) this document is not concerned with the performance of the compositions disclosed therein in the single wire burning test nor with the dripping behaviour of the composition. Accordingly, D1 cannot be of help for the skilled person trying to improve the performance in the single wire burning test or the dripping behaviour because this is simply not addressed in D1.

3.6 Even if considering the disclosure of D1, the skilled person would not receive any hint to apply a particular particle size distribution, let alone the distribution described in claim 1, as already discussed above. In addition, also when considering the disclosure in the examples of D1, especially that of Examples 1 to 8 of D1, the skilled person does not obtain any hint to the

claimed subject matter. For example, in Example 1, a calcium carbonate has been used as an inorganic filler with an average particle size of 0.7 micron yielding an LOI of 30.0. However, in Example 4, a calcium carbonate has been used with an average particle size of 5 microns which yielded an LOI of 30.5, i.e. an even better value than that of example 1. The skilled person, accordingly, would thus have no incentive at all to go to smaller particle sizes if trying to achieve improved flame retardant properties. Instead, as Examples 1 and 4 show, he would rather go to higher values at least for the average particle size.

3.7 Summing up, the above considerations clearly show that the skilled person starting from D1 does not obtain any information that would lead him to the claimed subject matter. Thus, the present invention cannot have been obvious from D1.

3.8 D2 is a much more remote prior art document than D1 because it relates to polycarbonate compositions. Thus, already from this aspect, the skilled person would not have any incentive to even consider this document, let alone in combination with D1. Accordingly, the claimed subject matter must be considered to involve an inventive step over the disclosure in either D1 or D2.

4. Summary

4.1 It has been shown in the above that the present application complies with the requirements of the PCT, in particular with clarity, novelty and inventive step. It is thus assumed that the International Preliminary Report on patentability will acknowledge compliance with the requirements of the PCT

4.2 In case there should be further objections by the Examiner, issuance of a further

written opinion

or alternatively a

telephone conversation

are herewith requested.

Respectfully submitted,

Dr. Bernhard Pillep